Fisher® 685SE and 685SR Piston Actuators

The 685SE and 685SR are medium to large spring-return, double-acting piston actuators that provide accurate, high thrust output for short to long travel applications. These actuators are designed for use with a variety of medium to large Fisher sliding-stem control valves including the easy-e™, FB, TBX,CVX, HP, EH, and 461.

These actuators feature an internal bias spring that forces the actuator piston rod to extend (685SE) or retract (685SR) upon a loss of supply pressure, thereby ensuring a fail-closed or fail-open mode of operation. This effectively eliminates the need for a trip valve and volume tank in most constructions.

Several configurations are available to cover a wide range of application requirements. Typical travels range from 25 to 610 mm (1 to 24 inches) and cylinder diameters range from 254 to 711 mm (10 to 28 inches).

The 685SE and 685SR can be used with the FIELDVUE™ DVC6200 digital valve controller for throttling applications, or with switching valves for on-off control. This actuator can also be fitted with volume boosters for fast stroking requirements.

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Features

- **High Thrust Capability –** Maximum thrusts of up to 354 kN (79,000 lbf) can be produced, when supply pressure is available.
- **Broad Application Coverage –** Standard constructions offer travels of up to 610 mm (24 inches) and cylinder diameters of up to 711 mm (28 inches). Even larger constructions are available upon request.
- **Low Friction –** Low friction piston seals and either chrome plated or fluoropolymer coated cylinder bores reduce sliding friction and wear.
- **Double Acting Construction –** Pressure on both sides of the piston results in stiff, precise positioning.
- **Wide Temperature Range –** Standard constructions offer a temperature range of -40 to 93°C (-40 to 200°F), however higher or lower temperatures are possible. Special constructions can operate as low as -54°C (-65°F) and as high as 204°C (400°F).
- **Mechanical Fail Mode –** Depending on construction, an internal bias spring will force the piston rod to retract or extend upon a loss of supply pressure.
- **Manual Override –** An optional side-mounted handwheel or hydraulic hand-pump is capable of extending or retracting the actuator manually and can be engaged at any position from full open to full closed.

Table 1. Specifications

Operating Pressure(1)

Minimum: 2.7 bar (40psig)

Maximum Allowable: 10.3 bar (150 psig)

Consult your Emerson Process Management sales office for supply pressures under 40 psig

Travel(2)

25 mm (1 inch) through 610 mm (24 inch)
See table 2

Thrust Capabilities

Designed to meet the application requirements

Piston Diameter and Area(2)

Available in 51 mm (2 inch) increments between 254 mm (10 inch) and 711 mm (28 inch)
See table 2

For additional sizes, contact your Emerson Process Management sales office.

Operative Temperature Limits

Standard: -40 to 93°C (-40 to 200°F)

Low Temperature: -54 to 93°C (-65 to 200°F)(3)
High Temperature: -32 to 204°C (-25 to 400°F)(3)

Yoke Boss and Valve Stem Diameter

■ 90.5 mm (3-9/16 inch) yoke boss with 19.1 mm (3/4 inch) stem ■ 127 mm (5 inch) yoke boss with 25.4 mm (1 inch) stem ■ 127 mm (5 inch) yoke boss with 31.8 mm (1-1/4 inch) stem ■ 127 mm (5H inch) yoke boss with 32 mm (1-1/4 inch) stem ■ 178 mm (7 inch) yoke boss with 51 mm (2 inch) stem

Pressure Connections

See table 3

Instrument Mounting

Mounting kits are available for use with the FIELDVUE DVC6200 series digital valve controller

Construction Materials

PART	MATERIAL
Yoke	ASTM A36 (steel)
Piston	ASTM A36 (steel)
Cylinder	**254 to 559 mm (10 to 22 inch) cylinder:** 1026 DOM (steel) with chrome-plated bore **610 to 711 mm (24 to 28 inch) cylinder:** ASTM A516 Grade 70 (steel) with fluoropolymer coated bore
Upper/Lower Heads	ASTM A36 (steel)
Outer Spring Cartridge	ASTM A36 (steel)
Tie Bolt	ASTM A311 1045, Class B (steel)
Piston Rod	S31603 (316L SST)
Stem Connector	ASTM A36 (steel)

Manual Override (optional)

Size 10 to 26: Handwheel

Size 28: Hydraulic Hand-pump(4)

Weights

See tables 9 and 10

Lifting Point Load Ratings

See table 11

Options

■ Manual Override, ■ Volume Boosters,
■ Fisher Optimized Digital Valve (ODV) Package

Dimensions

See figures 2 and 3 and tables 4 and 5

Certifications

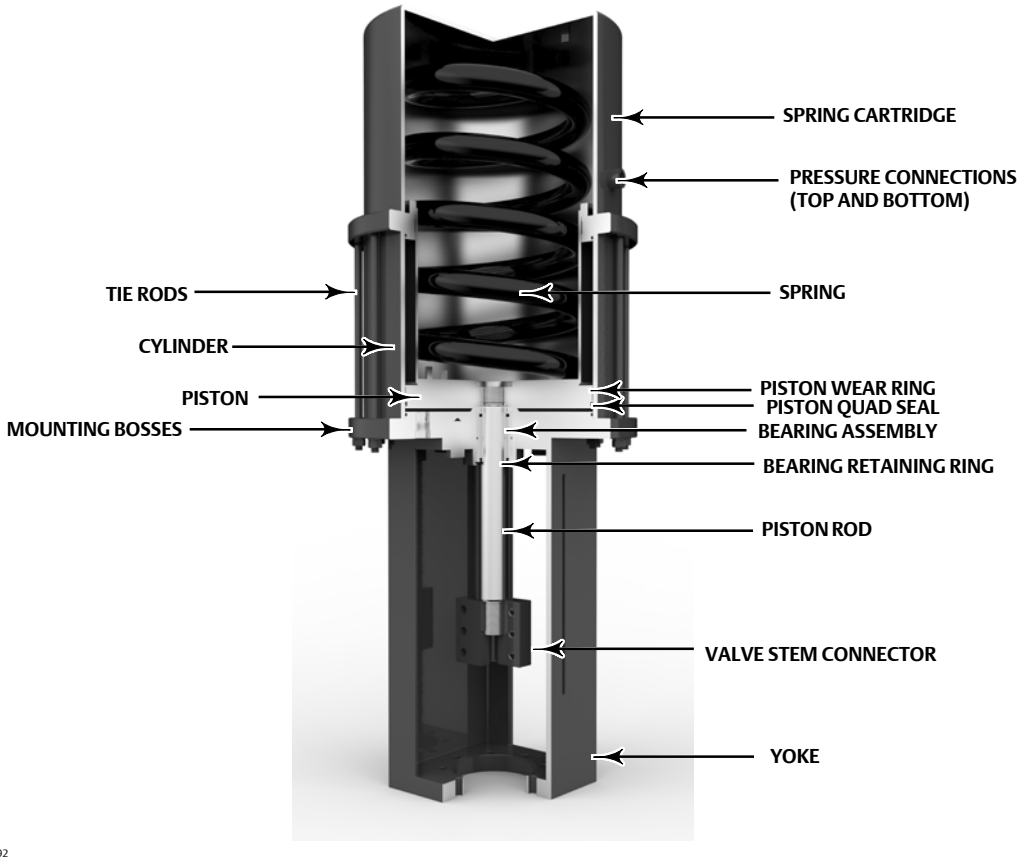
■ Pressure Equipment Directive (PED) 97/23/EC,
■ ATEX Group II Category 2 Gas and Dust

CE Ex II 2 G D ,

■ Systematic Safety Integrity, SIL 3, ■ GOST-R (Russia), ■ GOST-K (Kazakhstan)

1. The pressure/temperature limits in this bulletin and any other applicable standard or code should not be exceeded.
2. Consult your Emerson Process Management sales office for larger travels or cylinder diameters. The Fisher 657, 667, and 585C family of actuators can be used for smaller travels or cylinder diameters.
3. Consult your Emerson Process Management sales office for applications requiring low or high temperature requirements.
4. Consult your Emerson Process Management sales office for applications requiring a manual override on a size 28 actuator.

Figure 1. Fisher 685SE Piston Actuator



Principle of Operation

685SE and 685SR piston actuators utilize a piston that moves inside of a cylinder to generate thrust. A seal contained on the circumference of the piston provides a seal between the piston and the cylinder, preventing supply pressure leakage. A bias spring that is either below or above the piston, depending on construction, will retract or extend the piston rod upon a loss of supply pressure. This fail action will result in forcing an attached control valve to either fail-open or fail-closed.

From an equilibrium state, the actuator operates by reacting to a force unbalance that is created by increasing supply pressure on one side of the piston, and decreasing it on the other. This moves the piston up or down, and results in a repositioning of the attached control valve. Travel can be adjusted using travel limits within a valve positioner, which limit the travel range of the actuator. The optional handwheel manual override does not have the ability to act as a hard travel stop.

An optional handwheel or hydraulic hand-pump manual override is capable of extending or retracting the actuator manually and can be engaged at any position from full open to full close. This handwheel override utilizes a worm gear assembly that is attached to the stem connector and not attached to the cylinder or piston rod. This enables the handwheel override function to reposition the control valve even if the actuator cylinder or piston is removed for maintenance. The hydraulic hand-pump override utilizes a hydraulic cylinder that is connected to the piston rod, which is controlled by a manual hand-pump.

Instrument Selection

An excellent selection of sensitive and accurate instruments is available for 685SE and 685SR spring-return piston actuators. These include the FIELDVUE DVC6200 digital valve controller, as well as volume boosters.

DVC6200 Digital Valve Controller

FIELDVUE DVC6200 digital valve controllers are communicating, microprocessor-based current-to-pneumatic instruments. In addition to the traditional function of converting a current signal to a pressure signal, DVC6200 digital valve controllers, using HART® or FOUNDATION™ fieldbus communications protocol, give easy access to information critical to process operation.

For additional information, refer to Fisher bulletin 62.1:DVC6200 (D103415X012) or 62.1:DVC6200f (D103399X012), available at www.FIELDVUE.com or from your Emerson Process Management sales office.

Table 2. Standard Constructions(1)

ACTUATOR SIZE	PISTON DIAMETER		PISTON ROD		PISTON AREA		VALVE STEM CONNECTOR SIZE		YOKE BOSS DIAMETER		VALVE TRAVEL			
											Minimum		Maximum	
	mm	Inch	mm	Inch	cm^2	$Inch^2$	mm	Inch	mm	Inch	mm	Inch	mm	Inch
10	254	10	16	2.41	507	79	19	3/4	90	3-9/16	25	1	203	8
							25	1	127	5	25	1	203	8
							32 or 51	1-1/4 or 2	127 or 178	5H or 7	25	1	610	24
12	305	12	16	2.41	730	113	19	3/4	90	3-9/16	25	1	154	6
							25	1	127	5	25	1	203	8
							32 or 51	1-1/4 or 2	127 or 178	5H or 7	25	1	610	24
14	356	14	32	4.91	993	154	25	1	127	5	25	1	203	8
							32 or 51	1-1/4 or 2	127 or 178	5H or 7	25	1	610	24
16	406	16	32	4.91	1297	201	25	1	127	5	25	1	203	8
							32 or 51	1-1/4 or 2	127 or 178	5H or 7	25	1	610	24
18	457	18	32	4.91	1642	254	25	1	127	5	25	1	203	8
							32 or 51	1-1/4 or 2	127 or 178	5H or 7	25	1	610	24
20	508	20	46	7.07	2027	314	25	1	127	5	25	1	203	8
							32 or 51	1-1/4 or 2	127 or 178	5H or 7	25	1	610	24
22	559	22	46	7.07	2452	380	25	1	127	5	25	1	203	8
							32 or 51	1-1/4 or 2	127 or 178	5H or 7	25	1	610	24
24	610	24	62	9.62	2919	452	25	1	127	5	25	1	203	8
							32 or 51	1-1/4 or 2	127 or 178	5H or 7	25	1	610	24
26	660	26	62	9.62	3425	531	25	1	127	5	25	1	203	8
							32 or 51	1-1/4 or 2	127 or 178	5H or 7	25	1	610	24
28	711	28	62	9.62	3973	616	25	1	127	5	25	1	203	8
							32 or 51	1-1/4 or 2	127 or 178	5H or 7	25	1	610	24

1. Consult your Emerson Process Management sales office for additional sizes.

Table 3. Supply Connections

ACTUATOR SIZE	SUPPLY CONNECTION	
	Size, NPT	Quantity (Top/Bottom)
10	3/8	1/1
		2/2 (standard)
12	3/4	1/1
		2/2 (standard)
14 to 28	3/4 (standard), 1, or 1-1/4	1/1
		2/2 (standard for 3/4 NPT only)

Table 4. Dimensions A, G, H, and L

ACTUATOR		A		G		H		L	
Type	Size	mm	Inch	mm	Inch	mm	Inch	mm	Inch
685SE	10	318	12.50	338	13.31	235	9.25	394	15.50
	12	381	15.00	338	13.31	235	9.25	457	18.00
	14	432	17.00	435	17.13	253	9.98	508	20.00
	16	489	19.25	435	17.13	253	9.98	559	22.00
	18	543	21.38	435	17.13	253	9.98	610	24.00
	20	591	23.25	581	22.88	434	17.10	660	26.00
	22	654	25.75	581	22.88	434	17.10	711	28.00
	24	711	28.00	584	23.00	484	19.06	762	30.00
	26	775	30.50	584	23.00	484	19.06	845	33.25
	28	826	32.50	(1)	(1)	(1)	(1)	895	35.25
685SR	10	318	12.50	338	13.31	235	9.25	Not Applicable	
	12	381	15.00	338	13.31	235	9.25		
	14	432	17.00	435	17.13	253	9.98		
	16	489	19.25	435	17.13	253	9.98		
	18	543	21.38	435	17.13	253	9.98		
	20	591	23.25	581	22.88	434	17.10		
	22	654	25.75	581	22.88	434	17.10		
	24	711	28.00	584	23.00	484	19.06		
	26	775	30.50	584	23.00	484	19.06		
	28	826	32.50	(1)	(1)	(1)	(1)		

1. Consult your Emerson Process Management sales office.

Table 5. Dimensions E and F

ACTUATOR SIZE	WITHOUT MANUAL OVERRIDE								WITH MANUAL OVERRIDE							
	E				F				E				F			
	5H or 3-9/16 Inch Yoke Boss		7 Inch Yoke Boss		5H or 3-9/16 Inch Yoke Boss		7 Inch Yoke Boss		5H or 3-9/16 Inch Yoke Boss		7 Inch Yoke Boss		5H or 3-9/16 Inch Yoke Boss		7 Inch Yoke Boss	
	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch
10	222	8.75	267	10.50	203	8.00	229	9.00	251	9.88	279	11.00	229	9.00	229	9.00
12	222	8.75	267	10.50	203	8.00	229	9.00	251	9.88	279	11.00	229	9.00	229	9.00
14	229	9.00	267	10.50	203	8.00	229	9.00	238	9.38	279	11.00	305	12.00	305	12.00
16	229	9.00	267	10.50	203	8.00	229	9.00	238	9.38	279	11.00	305	12.00	305	12.00
18	229	9.00	267	10.50	203	8.00	229	9.00	238	9.38	279	11.00	305	12.00	305	12.00
20	305	12.00	305	12.00	305	12.00	305	12.00	305	12.00	305	12.00	330	13.00	330	13.00
22	305	12.00	305	12.00	305	12.00	305	12.00	305	12.00	305	12.00	330	13.00	330	13.00
24	406	16.00	406	16.00	457	18.00	457	18.00	476	18.75	476	18.75	457	18.00	457	18.00
26	406	16.00	406	16.00	457	18.00	457	18.00	476	18.75	476	18.75	457	18.00	457	18.00
28	457	18.00	457	18.00	457	18.00	457	18.00	476	18.75	476	18.75	457	18.00	457	18.00

Table 6. Dimensions B and C

ACTUATOR SIZE	MAXIMUM VALVE TRAVEL		MAXIMUM B		C (WITHOUT MANUAL OVERRIDE)						C (WITH MANUAL OVERRIDE)					
					3-9/16 Inch Yoke Boss		5/5H Inch Yoke Boss		7 Inch Yoke Boss		3-9/16 Inch Yoke Boss		5/5H Inch Yoke Boss		7 Inch Yoke Boss	
	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch
10, 12	25	1	457	18.00	808	31.82	878	34.57	910	35.82	992	39.06	992	39.06	1024	40.31
	51	2	559	22.00	935	36.82	980	38.57	1011	39.82	1094	43.06	1094	43.06	1125	44.31
	76	3	584	23.00	986	38.82	1005	39.57	1037	40.82	1167	45.93	1167	45.93	1179	46.43
	102	4	705	27.75	1118	44.00	1126	44.32	1157	45.57	1287	50.68	1287	50.68	1300	51.18
	127	5	737	29.00	1243	48.94	1243	48.94	1268	49.94	1357	53.43	1421	55.93	1383	54.43
	140	5.5	800	31.50	1307	51.44	1307	51.44	1332	52.44	1421	55.93	1484	58.43	1446	56.93
	152	6	813	32.00	1319	51.94	1319	51.94	1345	52.94	1497	58.93	1497	58.93	1459	57.43
	178	7	838	33.00	1345	52.94	1345	52.94	1421	55.94	1522	59.93	1522	59.93	1535	60.43
	203	8	1092	43.00	1599	62.94	1599	62.94	1675	65.94	1776	69.93	1776	69.93	1789	70.43
	229	9	1118	44.00			1764	69.44	1764	69.44			1878	73.93	1878	73.93
	254	10	1143	45.00			1789	70.44	1789	70.44			1903	74.93	1903	74.93
	267	10.5	1156	45.50			1802	70.94	1802	70.94			1916	75.43	1916	75.43
	279	11	1168	46.00			1815	71.44	1815	71.44			1929	75.93	1967	77.43
	305	12	1346	53.00			1992	78.44	1992	78.44			2132	83.93	2145	84.43
	610	24	(1)	(1)			(1)	(1)	(1)	(1)			(1)	(1)	(1)	(1)
14	25	1	521	20.50			968	38.13	1000	39.38			1129	44.44	1160	45.69
	51	2	597	23.50			1045	41.13	1076	42.38			1205	47.44	1237	48.69
	76	3	622	24.50			1070	42.13	1102	43.38			1278	50.31	1291	50.81
	102	4	673	26.50			1121	44.13	1153	45.38			1329	52.31	1341	52.81
	127	5	749	29.50			1283	50.50	1308	51.50			1507	59.31	1468	57.81
	140	5.5	787	31.00			1321	52.00	1346	53.00			1545	60.81	1507	59.31
	152	6	800	31.50			1334	52.50	1359	53.50			1557	61.31	1519	59.81
	178	7	883	34.75			1416	55.75	1492	58.75			1640	64.56	1653	65.06
	203	8	978	38.50			1511	59.50	1588	62.50			1735	68.31	1748	68.81
	229	9	1003	39.50			1676	66.00	1676	66.00			1837	72.31	1837	72.31
	254	10	1035	40.75			1708	67.25	1708	67.25			1869	73.56	1869	73.56
	267	10.5	1124	44.25			1797	70.75	1797	70.75			1957	77.06	1957	77.06
	279	11	1137	44.75			1810	71.25	1810	71.25			1970	77.56	2008	79.06
	305	12	1162	45.75			1835	72.25	1835	72.25			2021	79.56	2034	80.06
	610	24	(1)	(1)			(1)	(1)	(1)	(1)			(1)	(1)	(1)	(1)
16	25	1	521	20.50			968	38.13	1000	39.38			1129	44.44	1160	45.69
	51	2	597	23.50			1045	41.13	1076	41.63			1205	47.44	1237	48.69
	76	3	673	26.50			1121	44.13	1153	44.63			1329	52.31	1341	52.91
	102	4	699	27.50			1146	45.13	1178	47.38			1354	53.31	1367	53.81
	127	5	730	28.75			1264	49.75	1289	51.75			1488	58.56	1449	57.06
	140	5.5	819	32.25			1353	53.25	1378	54.25			1576	62.06	1538	60.56
	152	6	832	32.75			1365	53.75	1391	54.75			1589	62.56	1551	61.06
	178	7	933	36.75			1467	57.75	1543	59.75			1691	65.56	1703	67.06
	203	8	1035	40.75			1568	61.75	1645	62.75			1792	68.56	1805	71.06
	229	9	1060	41.75			1734	68.25	1734	69.25			1894	75.56	1894	74.56
	254	10	1086	42.75			1759	69.25	1759	70.25			1919	76.56	1919	75.56
	267	10.5	1200	47.25			1873	73.75	1873	70.75			2034	77.06	2034	80.06
	279	11	1213	47.75			1886	74.25	1886	71.25			2046	77.56	2084	82.06
	305	12	1238	48.75			1911	75.25	1911	75.25			2097	82.56	2110	83.06
	610	24	(1)	(1)			(1)	(1)	(1)	(1)			(1)	(1)	(1)	(1)

Table 6. Dimensions B and C (continued)

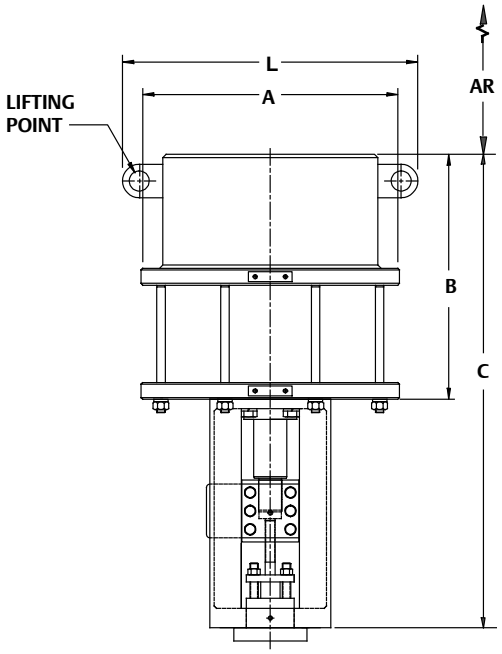
ACTUATOR SIZE	MAXIMUM VALVE TRAVEL		MAXIMUM B		C (WITHOUT MANUAL OVERRIDE)				C (WITH MANUAL OVERRIDE)			
					5/5H Inch Yoke Boss		7 Inch Yoke Boss		5/5H Inch Yoke Boss		7 Inch Yoke Boss	
	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch
18	25	1	521	20.50	968	38.13	1000	39.38	1129	44.44	1160	45.69
	51	2	578	22.75	1026	40.38	1057	41.63	1186	46.69	1218	47.94
	76	3	654	25.75	1102	43.38	1133	44.63	1310	51.56	1322	52.06
	102	4	724	28.50	1172	46.13	1203	47.38	1380	54.31	1392	54.81
	127	5	756	29.75	1289	50.75	1314	51.75	1513	59.56	1475	58.06
	140	5.5	819	32.25	1353	53.25	1378	54.25	1576	62.06	1538	60.56
	152	6	832	32.75	1365	53.75	1391	54.75	1589	62.56	1551	61.06
	178	7	908	35.75	1441	56.75	1518	59.75	1665	65.56	1678	66.06
	203	8	984	38.75	1518	59.75	1594	62.75	1742	68.56	1754	69.06
	229	9	1086	42.75	1759	69.25	1759	69.25	1919	75.56	1919	75.56
	254	10	1111	43.75	1784	70.25	1784	70.25	1945	76.56	1945	76.56
	267	10.5	1124	44.25	1797	70.75	1797	70.75	1957	77.06	1957	77.06
	279	11	1137	44.75	1810	71.25	1810	71.25	1970	77.56	2008	79.06
	305	12	1238	48.75	1911	75.25	1911	75.25	2097	82.56	2110	83.06
	610	24	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
20	25	1	565	22.25	1052	41.44	1084	42.69	1188	46.76	1219	48.01
	51	2	641	25.25	1129	44.44	1160	45.69	1264	49.76	1296	51.01
	76	3	699	27.50	1186	46.69	1218	47.94	1369	53.88	1381	54.38
	102	4	724	28.50	1211	47.69	1243	48.94	1394	54.88	1407	55.38
	127	5	819	32.25	1392	54.81	1418	55.81	1591	62.63	1553	61.13
	140	5.5	914	36.00	1487	58.56	1513	59.56	1686	66.38	1648	64.88
	152	6	927	36.50	1500	59.06	1526	60.06	1699	66.88	1661	65.38
	178	7	1003	39.50	1576	62.06	1653	65.06	1775	69.88	1788	70.38
	203	8	1099	43.25	1672	65.81	1748	68.81	1870	73.63	1883	74.13
	229	9	1181	46.50	1894	74.56	1894	74.56	2029	79.88	2029	79.88
	254	10	1207	47.50	1919	75.56	1919	75.56	2054	80.88	2054	80.88
	267	10.5	1238	48.75	1951	76.81	1951	76.81	2086	82.13	2086	82.13
	279	11	1251	49.25	1964	77.31	1964	77.31	2099	82.63	2137	84.13
	305	12	1327	52.25	2040	80.31	2040	80.31	2200	86.63	2213	87.13
	610	24	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
22	25	1	572	22.50	1059	41.69	1091	42.94	1194	47.01	1226	48.26
	51	2	673	26.50	1160	45.69	1192	46.94	1296	51.01	1327	52.26
	76	3	749	29.50	1237	48.69	1268	49.94	1419	55.88	1432	56.38
	102	4	826	32.50	1313	51.69	1345	52.94	1496	58.88	1508	59.38
	127	5	851	33.50	1424	56.06	1449	57.06	1623	63.88	1584	62.38
	140	5.5	864	34.00	1437	56.56	1462	57.56	1635	64.38	1597	62.88
	152	6	876	34.50	1449	57.06	1475	58.06	1648	64.88	1610	63.38
	178	7	1029	40.50	1602	63.06	1678	66.06	1800	70.88	1813	71.38
	203	8	1054	41.50	1627	64.06	1703	67.06	1826	71.88	1838	72.38
	229	9	1105	43.50	1818	71.56	1818	71.56	1953	76.88	1953	76.88
	254	10	1130	44.50	1843	72.56	1843	72.56	1978	77.88	1978	77.88
	267	10.5	1295	51.00	2008	79.06	2008	79.06	2143	84.38	2143	84.38
	279	11	1308	51.50	2021	79.56	2021	79.56	2156	84.88	2194	86.38
	305	12	1334	52.50	2046	80.56	2046	80.56	2207	86.88	2219	87.38
	610	24	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)

Table 6. Dimensions B and C (continued)

ACTUATOR SIZE	MAXIMUM VALVE TRAVEL		MAXIMUM B		C (WITHOUT MANUAL OVERRIDE)				C (WITH MANUAL OVERRIDE)			
					5/5H Inch Yoke Boss		7 Inch Yoke Boss		5/5H Inch Yoke Boss		7 Inch Yoke Boss	
	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch
24	25	1	572	22.50	1092	43.01	1124	44.26	1254	49.38	1286	50.63
	51	2	629	24.75	1149	45.26	1181	46.51	1311	51.63	1343	52.88
	76	3	679	26.75	1200	47.26	1232	48.51	1410	55.50	1422	56.00
	102	4	775	30.50	1296	51.01	1327	52.26	1505	59.25	1518	59.75
	127	5	800	31.50	1407	55.38	1432	56.38	1632	64.25	1594	62.75
	140	5.5	895	35.25	1502	59.13	1527	60.13	1727	68.00	1689	66.50
	152	6	908	35.75	1515	59.63	1540	60.63	1740	68.50	1702	67.00
	178	7	933	36.75	1540	60.63	1616	63.63	1765	69.50	1778	70.00
	203	8	1010	39.75	1616	63.63	1692	66.63	1842	72.50	1854	73.00
	229	9	1162	45.75	1908	75.13	1908	75.13	2070	81.50	2070	81.50
	254	10	1187	46.75	1934	76.13	1934	76.13	2096	82.50	2096	82.50
	267	10.5	1200	47.25	1946	76.63	1946	76.63	2108	83.00	2108	83.00
	279	11	1213	47.75	1959	77.13	1959	77.13	2121	83.50	2159	85.00
	305	12	1365	53.75	2112	83.13	2112	83.13	2299	90.50	2311	91.00
	610	24	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
26, 28	25	1	597	23.50	1118	44.01	1149	45.26	1280	50.38	1311	51.63
	51	2	622	24.50	1143	45.01	1175	46.26	1305	51.38	1337	52.63
	76	3	705	27.75	1226	48.26	1257	49.51	1435	56.50	1448	57.00
	102	4	730	28.75	1251	49.26	1283	50.51	1461	57.50	1473	58.00
	127	5	806	31.75	1413	55.63	1438	56.63	1638	64.50	1600	63.00
	140	5.5	921	36.25	1527	60.13	1553	61.13	1753	69.00	1715	67.50
	152	6	933	36.75	1540	60.63	1565	61.63	1765	69.50	1727	68.00
	178	7	959	37.75	1565	61.63	1642	64.63	1791	70.50	1803	71.00
	203	8	1137	44.75	1743	68.63	1819	71.63	1969	77.50	1981	78.00
	229	9	1162	45.75	1908	75.13	1908	75.13	2070	81.50	2070	81.50
	254	10	1187	46.75	1934	76.13	1934	76.13	2096	82.50	2096	82.50
	267	10.5	1200	47.25	1946	76.63	1946	76.63	2108	83.00	2108	83.00
	279	11	1213	47.75	1959	77.13	1959	77.13	2121	83.50	2159	85.00
	305	12	1238	48.75	1985	78.13	1985	78.13	2172	85.50	2184	86.00
	610	24	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)

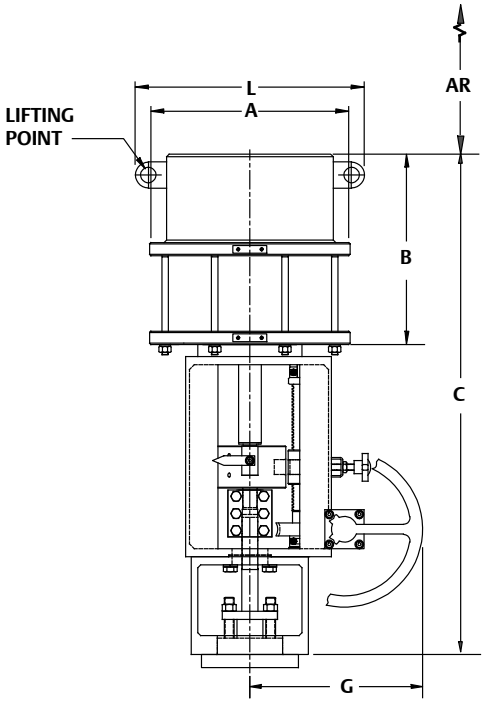
1. Consult your Emerson Process Management sales office.

Figure 2. Fisher 685SE Actuator Dimensions



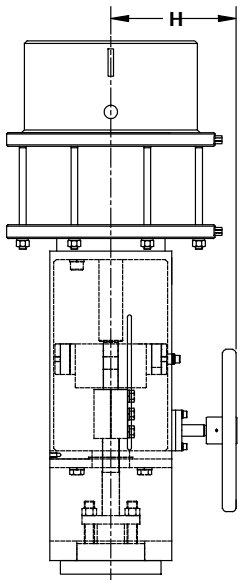
24031-12

FRONT VIEW OF ACTUATOR WITHOUT MANUAL OVERRIDE



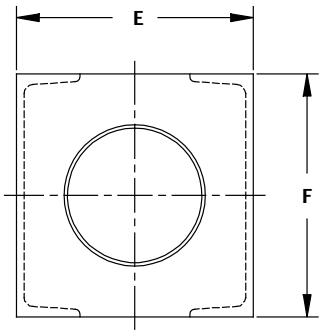
25439-12

FRONT VIEW OF ACTUATOR WITH HANDWHEEL MANUAL OVERRIDE



25439-12

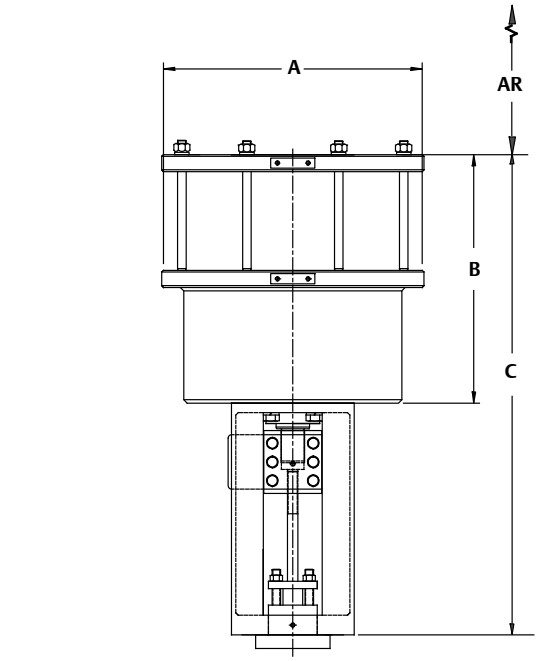
LEFT VIEW OF ACTUATOR WITH HANDWHEEL MANUAL OVERRIDE



24031-12

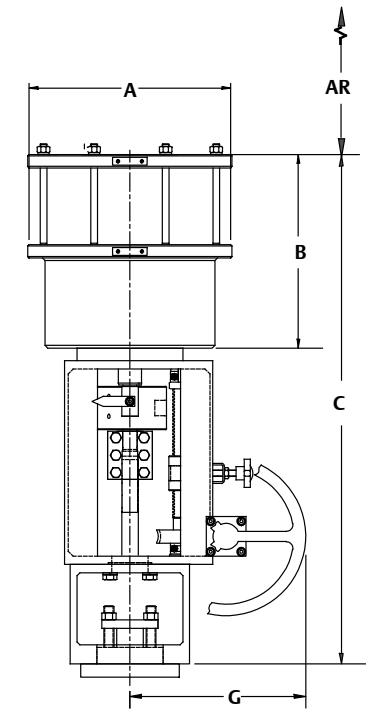
VIEW OF BOTTOM OF YOKE BOSS

Figure 3. Fisher 685SR Actuator Dimensions



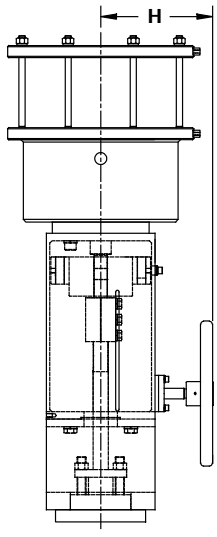
24436-12

FRONT VIEW OF ACTUATOR WITHOUT MANUAL OVERRIDE



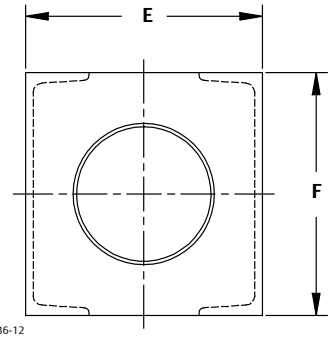
24540-12

FRONT VIEW OF ACTUATOR WITH HANDWHEEL MANUAL OVERRIDE



24540-12

LEFT VIEW OF ACTUATOR WITH HANDWHEEL MANUAL OVERRIDE



24436-12

VIEW OF BOTTOM OF YOKE BOSS

Table 7. Actuator Removal Clearance (AR)

MAXIMUM VALVE TRAVEL		AR (WITHOUT MANUAL OVERRIDE)						AR (WITH MANUAL OVERRIDE)					
		3-9/16 Inch Yoke Boss		5/5H Inch Yoke Boss		7 Inch Yoke Boss		3-9/16 Inch Yoke Boss		5/5H Inch Yoke Boss		7 Inch Yoke Boss	
mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
102	4.0	267	10.50	343	13.50	368	14.50	343	13.50	343	13.50	368	14.50
203	8.0	318	12.50	318	12.50	343	13.50	356	14.00	381	15.00	343	13.50
305	12.0			356	14.00	356	14.00			356	14.00	356	14.00
406	16.0			356	14.00	356	14.00			356	14.00	356	14.00
508	20.0			356	14.00	356	14.00			356	14.00	356	14.00
610	24.0			356	14.00	356	14.00			356	14.00	356	14.00

Table 8. Handwheel Specifications

ACTUATOR SIZE	OUTPUT THRUST		HANDWHEEL DIAMETER		TURNS PER mm OF TRAVEL	TURNS PER INCH OR TRAVEL	MAXIMUM RIM FORCE REQUIRED	
	N	lbs	mm	Inch			N	lbs
10 to 12	44482	10000	305	12	3.8	96	290	65
14 to 18	88964	20000	406	16	3.0	80	380	85
20 to 26	133447	30000	610	24	2.8	72	450	100

Table 9. Approximate Weights for Constructions without Manual Override

ACTUATOR TYPE	MAX VALVE TRAVEL	APPROXIMATE WEIGHT FOR ACTUATOR SIZE, kg (lbs)									
	mm (inches)	10	12	14	16	18	20	22	24	26	28
685SE	25 (1.00)	109 (241)	147 (324)	221 (487)	270 (596)	315 (694)	462 (1018)	489 (1079)	680 (1500)	776 (1710)	931 (2053)
	51 (2.00)	114 (251)	156 (344)	231 (510)	284 (625)	329 (725)	479 (1056)	510 (1124)	704 (1551)	802 (1768)	957 (2110)
	102 (4.00)	122 (270)	174 (383)	252 (556)	310 (683)	358 (789)	514 (1132)	551 (1215)	750 (1654)	855 (1884)	1009 (2225)
	152 (6.00)	131 (289)	192 (423)	273 (601)	336 (740)	387 (852)	548 (1209)	592 (1305)	797 (1757)	907 (2000)	1061 (2339)
	203 (8.00)	140 (308)	210 (462)	293 (647)	362 (798)	415 (916)	583 (1285)	633 (1396)	843 (1859)	960 (2116)	1113 (2454)
	254 (10.00)	148 (327)	227 (501)	314 (693)	388 (855)	444 (979)	617 (1361)	674 (1486)	890 (1962)	1012 (2232)	1165 (2569)
	305 (12.00)	157 (346)	245 (541)	335 (738)	414 (913)	473 (1042)	652 (1437)	715 (1577)	937 (2065)	1065 (2348)	1217 (2683)
	356 (14.00)	165 (365)	263 (580)	356 (784)	440 (971)	502 (1106)	686 (1513)	756 (1667)	983 (2168)	1118 (2464)	1269 (2798)
	406 (16.00)	174 (384)	281 (619)	376 (829)	466 (1028)	530 (1169)	721 (1589)	797 (1758)	1030 (2270)	1170 (2580)	1321 (2912)
	457 (18.00)	183 (403)	299 (659)	397 (875)	493 (1086)	559 (1233)	756 (1667)	838 (1848)	1076 (2373)	1223 (2696)	1373 (3027)
	508 (20.00)	191 (422)	317 (698)	418 (921)	519 (1143)	588 (1296)	790 (1742)	879 (1939)	1123 (2476)	1275 (2812)	1425 (3142)
	559 (22.00)	200 (441)	334 (737)	438 (966)	545 (1201)	617 (1359)	825 (1818)	921 (2029)	1170 (2578)	1328 (2928)	1477 (3256)
	610 (24.00)	209 (460)	352 (776)	459 (1012)	571 (1259)	645 (1423)	859 (1894)	962 (2120)	1216 (2681)	1381 (3044)	1529 (3371)
685SR	25 (1.00)	127 (281)	165 (363)	242 (533)	311 (685)	353 (778)	479 (1056)	557 (1228)	760 (1676)	869 (1915)	1101 (2427)
	51 (2.00)	132 (291)	174 (384)	253 (557)	325 (716)	368 (812)	497 (1096)	578 (1273)	784 (1727)	895 (1973)	1127 (2485)
	102 (4.00)	142 (312)	193 (426)	275 (605)	352 (776)	398 (878)	534 (1176)	619 (1364)	830 (1830)	948 (2089)	1179 (2599)
	152 (6.00)	151 (333)	212 (468)	297 (654)	380 (837)	429 (945)	570 (1257)	660 (1454)	877 (1933)	1000 (2206)	1231 (2714)
	203 (8.00)	161 (354)	232 (511)	318 (702)	407 (898)	459 (1012)	606 (1337)	701 (1545)	923 (2035)	1053 (2322)	1283 (2829)
	254 (10.00)	170 (375)	251 (553)	340 (750)	435 (958)	489 (1079)	643 (1417)	742 (1635)	970 (2138)	1106 (2438)	1335 (2944)
	305 (12.00)	180 (396)	270 (595)	362 (798)	462 (1019)	520 (1146)	679 (1497)	783 (1726)	1016 (2241)	1159 (2554)	1387 (3059)
	356 (14.00)	189 (417)	289 (638)	384 (847)	490 (1079)	550 (1212)	716 (1577)	824 (1816)	1063 (2344)	1211 (2670)	1439 (3173)
	406 (16.00)	199 (438)	308 (680)	406 (895)	517 (1140)	580 (1279)	752 (1657)	865 (1907)	1110 (2446)	1264 (2786)	1491 (3288)
	457 (18.00)	208 (459)	328 (722)	428 (943)	545 (1201)	611 (1346)	788 (1738)	906 (1997)	1156 (2549)	1317 (2903)	1544 (3403)
	508 (20.00)	218 (480)	347 (765)	450 (991)	572 (1261)	641 (1413)	825 (1818)	947 (2088)	1203 (2652)	1369 (3019)	1596 (3518)
	559 (22.00)	227 (501)	366 (807)	472 (1039)	600 (1322)	671 (1480)	861 (1898)	988 (2178)	1249 (2754)	1422 (3135)	1648 (3633)
	610 (24.00)	237 (522)	385 (849)	493 (1088)	627 (1382)	702 (1547)	897 (1978)	1029 (2269)	1296 (2857)	1475 (3251)	1700 (3747)

Table 10. Approximate Weights for Constructions with Handwheels

ACTUATOR TYPE	MAX VALVE TRAVEL	APPROXIMATE WEIGHT FOR ACTUATOR SIZE, kg (lbs)								
	mm (inches)	10	12	14	16	18	20	22	24	26
685SE	25 (1.00)	167 (369)	212 (468)	336 (742)	381 (839)	432 (953)	603 (1330)	675 (1489)	853 (1881)	941 (2075)
	51 (2.00)	173 (383)	221 (488)	347 (765)	394 (869)	447 (985)	621 (1370)	697 (1536)	876 (1932)	967 (2132)
	102 (4.00)	186 (410)	240 (529)	368 (811)	421 (928)	475 (1048)	658 (1450)	739 (1630)	922 (2033)	1019 (2246)
	152 (6.00)	199 (438)	259 (570)	389 (858)	448 (987)	504 (1111)	694 (1529)	782 (1723)	968 (2134)	1070 (2359)
	203 (8.00)	211 (465)	277 (611)	410 (904)	474 (1046)	532 (1174)	730 (1609)	824 (1817)	1014 (2235)	1122 (2473)
	254 (10.00)	224 (493)	296 (652)	431 (951)	501 (1105)	561 (1237)	766 (1689)	867 (1910)	1060 (2336)	1173 (2586)
	305 (12.00)	236 (521)	314 (693)	452 (997)	528 (1164)	590 (1300)	802 (1769)	909 (2004)	1106 (2438)	1225 (2700)
	356 (14.00)	249 (548)	333 (734)	473 (1043)	555 (1223)	618 (1363)	838 (1849)	951 (2098)	1152 (2539)	1276 (2814)
	406 (16.00)	261 (576)	352 (775)	494 (1090)	581 (1282)	647 (1426)	875 (1928)	994 (2191)	1197 (2640)	1328 (2927)
	457 (18.00)	274 (603)	370 (816)	515 (1136)	608 (1341)	675 (1489)	911 (2008)	1036 (2285)	1243 (2741)	1379 (3041)
	508 (20.00)	286 (631)	389 (857)	536 (1183)	635 (1400)	704 (1552)	947 (2088)	1079 (2378)	1289 (2842)	1431 (3154)
	559 (22.00)	299 (659)	407 (898)	557 (1229)	662 (1459)	732 (1615)	983 (2168)	1121 (2472)	1335 (2944)	1482 (3268)
	610 (24.00)	311 (686)	426 (939)	579 (1275)	688 (1518)	761 (1678)	1019 (2248)	1164 (2566)	1381 (3045)	1534 (3382)
685SR	25 (1.00)	185 (407)	230 (506)	357 (788)	421 (929)	471 (1038)	666 (1468)	743 (1638)	933 (2057)	1034 (2280)
	51 (2.00)	191 (422)	239 (528)	368 (812)	435 (960)	486 (1071)	685 (1510)	764 (1685)	956 (2108)	1060 (2337)
	102 (4.00)	204 (451)	259 (572)	391 (861)	463 (1022)	516 (1137)	723 (1594)	807 (1779)	1002 (2209)	1112 (2451)
	152 (6.00)	218 (480)	279 (616)	413 (910)	491 (1084)	546 (1204)	761 (1677)	849 (1872)	1048 (2310)	1163 (2565)
	203 (8.00)	231 (509)	299 (660)	435 (959)	520 (1146)	576 (1270)	799 (1761)	892 (1966)	1094 (2411)	1215 (2679)
	254 (10.00)	244 (538)	319 (704)	457 (1008)	548 (1208)	606 (1337)	837 (1845)	934 (2059)	1140 (2512)	1267 (2792)
	305 (12.00)	257 (568)	339 (748)	480 (1057)	576 (1270)	636 (1403)	875 (1929)	977 (2153)	1185 (2614)	1318 (2906)
	356 (14.00)	271 (597)	359 (792)	502 (1106)	604 (1332)	667 (1469)	913 (2013)	1019 (2247)	1231 (2715)	1370 (3020)
	406 (16.00)	284 (626)	379 (836)	524 (1155)	632 (1394)	697 (1536)	951 (2096)	1061 (2340)	1277 (2816)	1421 (3134)
	457 (18.00)	297 (655)	399 (880)	546 (1204)	660 (1456)	727 (1602)	989 (2180)	1104 (2434)	1323 (2917)	1473 (3248)
	508 (20.00)	310 (684)	419 (924)	568 (1253)	688 (1518)	757 (1669)	1027 (2264)	1146 (2527)	1369 (3018)	1525 (3361)
	559 (22.00)	324 (714)	439 (968)	591 (1302)	716 (1580)	787 (1735)	1065 (2348)	1189 (2621)	1415 (3120)	1576 (3475)
	610 (24.00)	337 (743)	459 (1012)	613 (1351)	745 (1642)	817 (1801)	1103 (2432)	1231 (2715)	1461 (3221)	1628 (3589)

Table 11. Lifting Point Load Ratings

ACTUATOR SIZE	LIFTING ORIENTATION	NUMBER OF LIFTING POINTS USED	MAXIMUM LOAD	
			kg	lbs
10	Actuator Center line Horizontal	2	810	1800
12 to 24		2	1540	3400
26 to 28		2	2860	6300
10	Actuator Center line Vertical	2	2080	4600
12 to 24		2	3760	8300
26 to 28		2	6350	14000

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